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Decreased Vascular Response To Phenylephrine In Pregnancy

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Normal pregnancy is characterized by arterial and venous vasodilation and by increased intravascular volume. It is widely believed that pregnant women have a diminished response to vasoconstricting and vasodilating drugs (1). The extent and nature of this alteration in vascular tone and response to vasoactive substances has been hard to study in humans due to the practical and ethical considerations of pregnancy. We used the dorsal hand vein/linear variable displacement transformer (LVDT) method of Aellig (2) to assess the vascular response to micro-dose infusions of phenylephrine (PE) during and after pregnancy.

Methods: After IRB approval and informed, written consent, 20 healthy pregnant women were studied between 32 and 37 weeks gestation and again at >12 weeks post-partum (PP). A vein on the dorsum of the hand was cannulated with a 25G intravenous catheter. Maternal SpO2, ECG and BP, and FHR were monitored. The LVDT was mounted on the back of the hand over the vein under investigation, 10 mm proximal to the cannula. A sphygmomanometer was inflated intermittently to a congestion pressure of 60 mm Hg resulting in a vertical displacement of the core of the LVDT. The amplitude of the core displacement at baseline and under drug infusion conditions is directly proportional to the size of the vein and was recorded for each drug dose studied. At all times, the total infusion rate was kept constant at 24 ml/hr. PE was infused starting at 12 ng/min and increased incrementally to a maximum of 9600 ng/min or when a dose resulting in 50% constriction was identified. The 50% constricting dose of PE (CD50) was determined by linear regression using points on the linear portion of the dose response curve. The log of the CD50 was used for statistical analysis and data was expressed as mean (95% confidence interval). Pregnant versus PP values were compared by paired t-test.

Results: There were no changes in maternal vital signs or FHR tracings during PE infusions. One pregnant woman did not constrict and another did not constrict to 50% even at the highest doses of PE (excluded from data analysis). Seven subjects have completed the PP phase of the study. All seven women required less PE for 50% constriction PP, and CD50 was decreased 6.5 fold (1.99,21.3).

	Pregnant (n=18)
-logCD50	5.57 (5.82,5.30)
CD50(ng/min)	2723 (1496,4955)

Pregnant (n=7)	Postpartum (n=7)
5.606 (6.16,5.05)	6.42 (6.95,5.90)
2477 (685,8974)	378 (113,1274)

Discussion: We have demonstrated that studying venous responses to a vasoconstrictor in pregnancy is possible with no systemic or fetal effects. Higher doses of PE are necessary to achieve venous constriction during pregnancy. This technique may be useful for the study of vascular tone and response to various agents in normal and hypertensive pregnancy.

Refs: 1. Am J Kidney Dis 1987; 9:303-7; 2. Br J Clin Pharmac 1981. 11: 237-43

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Low-Dose Epidural and Spinal Analgesia Decreases Parturient Metabolic Demand

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INTRODUCTION: The maternal metabolic consequences of current neuraxial labor analgesic techniques have not been thoroughly studied. Previous work showed decreased maternal oxygen consumption after epidural analgesia, however involved higher concentration techniques and cumbersome metabolic analysis.[1] Using a simple, noninvasive respiratory monitor, we studied the effects of spinal and low-dose epidural analgesia on indicators of maternal metabolic demand.

METHODS: Our institutional review committee approved this study; study subjects gave written consent. Thus far, 13 patients (9 spinal, 4 epidural) have participated. A respiratory profile monitor (CO_2SMO Plus, Novametrix, Wallingford, CT) measured respiratory rate (RR), end-tidal CO2 (ETCO2), minute production of CO2 (VCO2), and minute ventilation (VE). Five minutes of respiration were assessed immediately before, and 30 minutes after the anesthesiologist's choice of either spinal sufentanil 10 μg (CSE) or epidural bupivacaine 0.04% + fentanyl 1.7 μg/ml + epinephrine 1:600,000 (15 ml load, then 15 ml/hr). Comparisons utilized t-tests, with $p < 0.05$ as significant.

RESULTS: Compared to pre-analgesia measurements, VCO2 and VE decreased 27% and 33%, respectively, in CSE patients, and 20% and 13%, respectively, in epidural patients ($p < 0.05$ pre- vs. post-analgesia). CSE and epidural groups were not significantly different, and therefore combined for the mean values shown in the table below. Visual analog pain scores (VAS) decreased similarly among CSE and epidural groups.

	VCO2 (ml/min)	VE (L/min)	ETCO2 (mmHg)	RR
pre-analgesia	273.4	10.5	30.6	21.8
post-analgesia	195.7	6.2	33.3	15.5
p (pre vs. post)	0.002	0.002	0.06	0.06

DISCUSSION: Labor analgesia with either spinal sufentanil or low-dose epidural technique decreases maternal metabolic demand, as assessed by decreased VCO2 and decreased VE. Present sample size is inadequate to assess potential differences between these two analgesic techniques. This easy to use, noninvasive technique of metabolic analysis appears useful for comparing metabolic consequences of various forms of labor analgesia, and could provide additional objective data for discerning varying degrees of analgesia.

REFERENCES: 1. Anesthesiology 59:425-7, 1983.

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Obstetric Anesthesiology Workload in a Major Academic Center: A Basis for Cost-Effectiveness Analysis

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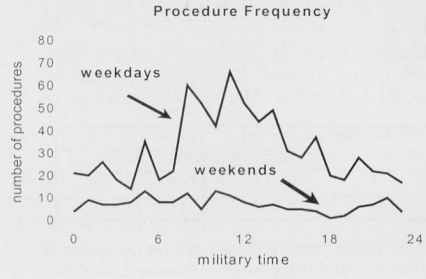
Introduction: Labor is typically considered an inherently random event. However, scheduled inductions of labor, prenatal care that identifies "high risk" pregnancies, scheduled Cesarean deliveries, and other external factors create an environment where intensity of workload, number of patients and acuity of medical care may change during the day and during the week. The ability to model daily workload has the potential to assist in determining staffing requirements and in providing better, more efficient care. The aim of the current study is to analyze the daily workload of the Section of Obstetric Anesthesiology.

Methods: Data were collected from the IRB-approved Obstetric Anesthesiology, MS Access 97, Database. Statistical analysis was performed with MS Excel 97 and TableCurve 2D 4.0. We analyzed data for all procedures from November 24, 1999 to January 24, 2000. Procedure start times were grouped in 1-hour intervals and cumulative number of procedures in each period was analyzed. Regular workdays (n=43) and weekends-holidays (n=22) were analyzed separately.



Results: There were a total of 968 procedures - 726 labor analgesia procedures, 184 Cesarean deliveries and 58 other (cerclage, D&C, epidural blood patch, hysterectomy, gynecology procedures and cephalic version). The mean number of procedures on weekdays was 32 (95% CI = 26 to 38), and 8 on weekends (95% CI = 7 to 9), a statistically significant difference (two-tailed Student's *t*-test, $P<0.001$).

Conclusions: There is a clear difference between daily workloads on weekdays and weekends/holidays. During weekdays there is a peak in the number of procedures between 8 AM and 4 PM which is not observed on weekends. Knowledge of workload patterns could allow models developed for the service industry to be applied to obstetric anesthesia care.

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Is Routine Pre-operative Hemoglobin and Group & Screen Testing Necessary Prior to Elective C-Section at Term?

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Introduction: Hemoglobin (Hb) and Group and Screen (G&S) testing is routinely performed immediately before all elective cesarean sections at our institution. The literature suggests that testing without regard to risk group or likelihood of abnormality leads to pursuit of false (+) results, delay in OR schedules and significant cost.[1,2,3] If patients at high risk for transfusion can be identified, can routine screening be eliminated without compromising patient safety?

Methods: In this ongoing retrospective chart review, The Obstetric Database at Mount Sinai Hospital was used to identify all term (≥35 weeks), elective c-sections performed between January 1994 and June 1999. Data collected included demographics, co-existing conditions, indication for C-section, results of pre-op blood work, surgical details (type of incision, blood loss, amount & type of transfusion, management of hemorrhage) and lowest Hb. Descriptive statistics were used.

Results: To date, 973 charts have been reviewed. Of these, 520 were repeat c-sections. Five patients (0.5%) required a transfusion.

	Diagnosis	*Blood loss (ml)*	*Hemoglobin*		*Time of transfusion*	*Packed Cells*	*Plasma*
			Preop	*Lowest*			
1	Placenta previa	3000	146	78	Postop	2	2
2	Placenta acreta	700	114	81	Postop	5	1
3	Multiple fibroids	massive	144	68	Intraop Postop	1 3	1 1
4	Morbid obesity	1000	128	70	Postop	4	0
5	Uterine tear	1500	113	69	Postop	1	0

Patients 1 & 2 had known risk factors.[1,2,4] Multiple fibroids were identified apriori by the Obstetrician as a risk factor in patient 3. Patient 4 had abdominal wall bleeding 4 hr postoperatively. Patient 5 suffered a surgical complication. Routine screening for these 973 patients cost $32,527.

Conclusion: The incidence of transfusion was slightly less than the 1.1-1.6% reported in the literature.[2,3] We conclude that elimination of routine Hb and G&S for term parturients with no identified risk factors represents a significant cost savings and does not compromise patient safety.

References:1) J Repro Med 1992; 37:649-52 2) Acta Anaes Belg 1990;41:139-44
3) Am J Obstet Gynecol 1990; 163:1551-3
4) Br J Obstet Gynecol 1997; 104:278-84